Doing Business with the DOE Laboratories of the Laboratory Coordinating Council

Supporting the Industries of the Future Partnerships of the Office of Industrial Technologies

LABORATORY COORDINATING COUNCIL
R&D Partnerships with Industry

for the
Office of Industrial Technologies
Office of Energy Efficiency and Renewable Energy
U.S Department of Energy

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Laboratory Coordinating Council Contacts for the Year 2002

An up-to-date list of contacts can be found on the Web at http://www.oit.doe.gov/lcc/contacts.shtml.

Albany Research Center
William Riley riley@alrc.doe.gov

Ames Laboratory
Dave Hoffman hoffman@ameslab.gov

Argonne National Laboratory (ANL)
1996 Chair-William Schertz schertzww@anl.gov

Brookhaven National Laboratory (BNL)
Michael J. Sebastino sebastino@bnl.gov

Idaho National Engineering and Environmental Laboratory (INEEL)
Marty Sorensen sms2@inel.gov

Kansas City Plant
Jack Quint jquint@kcp.com

Lawrence Berkeley National Laboratory (LBNL)
Don Grether DFGrether@lbl.gov

Lawrence Livermore National Laboratory (LLNL)
Robert S. Glass glass3@llnl.gov

Los Alamos National Laboratory (LANL)
Melissa Miller mami@lanl.gov

National Energy Technology Laboratory (NETL)
Jose Figueroa jose.figueroa@netl.doe.gov

National Renewable Energy Laboratory (NREL)
1997 Chair-Helena Chum Helena_Chum@nrel.gov

Oak Ridge National Laboratory (ORNL)
Pete Angelini Angelinip@ornl.gov

Pacific Northwest National Laboratory (PNNL)
1999-2001 Chair-Steven C. Weiner sc.weiner@pnl.gov

Sandia National Laboratories SNL)
Bill McLean bill_mclean@sandia.gov

Savannah River Technology Center
Ed Danko edward.danko@srs.gov

Y-12 Plant
Janice West Christman AAW@y12.doe.gov

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ACRONYMS

AEC	Atomic Energy Commission
AISI	American Iron and Steel Institute
ANL	Argonne National Laboratory
ARC	Albany Research Center
BNL	Brookhaven National Laboratory
CRADA	Cooperative Research and Development Agreement
DOE	U.S. Department of Energy
EERE	Energy Efficiency and Renewable Energy
ERDA	Energy Research and Development Administration
FWP	Field Work Proposal
GOCO	government owned-contractor operated
GOGO	government owned-government operated
INEEL	Idaho National Engineering and Environmental Laboratory
IOF	Industries of the Future
LANL	Los Alamos National Laboratory
LBNL	Lawrence Berkeley National Laboratory
LCC	Laboratory Coordinating Council
LLNL	Lawrence Livermore National Laboratory
M&O	Management and Operating
MOC	Memorandum of Cooperation
MOU	Memorandum of Understanding
NCMS	National Center for Manufacturing Sciences, Inc.
NETL	National Energy Technology Laboratory
NGV	New Generation of Vehicles
NREL	National Renewable Energy Laboratory
OIT	Office of Industrial Technologies
ORNL	Oak Ridge National Laboratory
PNNL	Pacific Northwest National Laboratory
R&D	research and development
RD&D	research, development and demonstration
RETT	Research, Education and Technology Transfer Organizations
SNL	Sandia National Laboratories
TPWG	Technology Partnerships Working Group
TTWG	Technology Transfer Working Group
UFA	Use of Facilities Agreement
USCAR	United States Council for Automotive Research
WFO	Work for Others Agreement

Executive Summary

The resources of the U.S. Department of Energy (DOE) laboratories are available to help American companies address new opportunities, improve resource efficiency, and develop new technologies for processes within DOE's Industries of the Future (IOF) program. Sixteen DOE laboratories, including 11 national laboratories, collaborate in a Laboratory Coordinating Council (LCC), to offer outstanding scientific and technology skills to support the growth and continued success of American process industries. The purpose of this document is to guide persons interested in taking advantage of the laboratory resources and to answer questions about how the laboratories and DOE do business.

The Office of Industrial Technologies (OIT), within the Energy Efficiency and Renewable Energy Office of the DOE, is working closely with various process industries—agriculture, aluminum, chemicals, forest products, glass, metalcasting, mining, petroleum, and steel—to catalyze industry visions and support development of technology roadmaps. LCC laboratories have unique capabilities to support the implementation of industry technology roadmaps in R&D collaborations.

The LCC was formed in 1995, when national, federal, and special purpose laboratories and facilities entered into a Memorandum of Cooperation. The Council set a goal to facilitate industry access to the combined capabilities of the laboratories to support the IOF program. The LCC gives industry access to a "virtual" laboratory that can be tailored to meet the specific requirements of almost any research need. Industry researchers no longer need to approach each laboratory separately to explore its capabilities and work out agreements. The LCC's objectives include:

- Support the IOF program.
- Support industry in developing technology roadmaps.
- Simplify access to laboratories and facilities through a clear, flexible structure that is responsive to needs.
- Stimulate and foster collaborations with industry and academia.

The LCC may be reached at http://www.oit.doe.gov/lcc/. Capabilities matrices for the sixteen laboratories are available in areas identified by the technology roadmaps. Agriculture, aluminum, forest products, glass, metalcasting, mining, and steel laboratory capabilities are currently available electronically. Companies can now easily access capabilities of the laboratories in their areas of interest.

The LCC responded to requests for common terms and conditions for doing business with the laboratories. Through the LCC, the laboratories agreed to use uniform terms and conditions for work conducted with one or several laboratories interested in that particular industry.

The laboratories offer three formal ways (see table) for collaborating with companies. DOE adopted the modular Cooperative Research and Development Agreement (CRADA) to provide a consistent legal framework for all laboratories to offer to industrial partners. The modular CRADA published for the first time DOE's full range of pre-approved terms and conditions. Because each government-owned and contractor-operated facility has its own prime contract with DOE and may be not-for-profit, nonprofit, or for-profit, there are minor differences in terms and conditions. Special provisions provide for intellectual property rights and patent waivers. Another opportunity is for industry to directly sponsor work at the laboratories through Work for Others agreements (WFO) in areas that relate to DOE missions. Laboratories also offer user facilities that companies can use for a fee to access significant capabilities developed in the performance of DOE mission work in energy resources, national security, science, and environmental quality. The Field Work Proposal (FWP) is a mechanism by which DOE authorizes funding to DOE laboratories and facilities. It is possible for a laboratory to contract with industry or universities when using funds provided by an existing FWP.

In many cases, laboratories can use funds provided by an FWP to participate in a CRADA with industry.

Agreement	Description	Information Protection	Intellectual Property
CRADA - Cooperative Research and Development Agreement	A contract that establishes a partnership with industry for collaborative R&D activities.	The parties may protect their CRADA data for up to five years. Typically, publishing party provides 30 days for review prior to intended publication. Other conditions may apply.	Each party retains title to its own inventions. An option for a royalty-bearing exclusive license is granted to the industry partner in a field of use for DOE laboratory inventions with reasonable compensation. Other conditions may apply.
Non-Federal WFO - Work for Others	A contract that provides industry and nonprofit institutions access to the DOE laboratories' unique facilities, equipment, and personnel.	Data rights negotiable, ranging from fully proprietary to all parties can use all data produced without restriction. Other conditions may apply.	Title to DOE laboratory inventions may go to the sponsor under a DOE class waiver, depending on work funded and type of funds.
User Agreement	A contract that provides access to certain unique DOE laboratory experimental facilities for research, testing, and developing prototypes.	Negotiable. There are proprietary and nonproprietary agreements.	A DOE class waiver provides that user inventions go to the user.

DOE responded to an industry concern about directly sponsoring work at the laboratories with the DOE depreciation and added factor charge by reducing this factor to 3% across all laboratories. Cash advances are required for WFOs and range from 30 to 90 days (depending on the prime contract that the laboratories' managing organizations have with the DOE).

There are also several informal ways for industry to work with the laboratories. Industry staff may be assigned to the laboratories to use their unique capabilities. Laboratory staff may also be assigned to industry to assist in joint research. Staff from the LCC participate in various technology roadmap activities and disseminate this information to all interested staff at the participating laboratories. To start, see table 2 for a laboratory having the desired expertise or, perhaps for convenience, a nearby laboratory. Then page 16 contains a list of LCC members to contact at each laboratory. The Web site link at the top of page 16 provides additional contact information.

DOE created a Technology Transfer Working Group to streamline and facilitate technology transfer across the DOE complex of laboratories. The *Report to the Department of Energy R&D Council on Partnering for Success: A Review of DOE Technology Transfer Policies and Procedures* is available electronically at http://www.er.doe.gov/production/octr/aeptr/ttwg.htm. This group is attempting to streamline the process of CRADAs and non-Federal Work for Others agreements throughout the DOE laboratory complex, beyond the 16 laboratories and facilities members of the LCC.

Introduction to Working with DOE Laboratories

Opportunities abound for businesses to use and profit from the outstanding scientific and technical resources of U.S. Department of Energy (DOE) laboratories and facilities. Businesses that have worked with DOE and the laboratories during the past two decades identified some opportunities for improving and streamlining the collaboration process such as :

- Patent ownership did not always flow to the business partner.
- Intellectual property ownership was sometimes unclear or not uniformly assigned.
- Contract terms, Cooperative Research and Development Agreements (CRADAs), and such varied from time to time and from laboratory to laboratory.
- Reaching a formal agreement was time consuming.
- The process was inconsistent among the laboratories.

A rather new group, the Laboratory Coordinating Council (LCC), set out to overcome past perceptions by establishing a better and easier way for companies in the Industries of the Future (IOF) program to work with DOE laboratories. Steps include:

- Educate industries about the resources.
- Establish uniform agreement formats.
- Clarify intellectual property ownership.

These steps will support vision statements and technology roadmaps that are prepared by each industry.

The LCC offers a new determination that the laboratories shall strive to be productive contributors to the growth and success of American business by applying science and technology. The LCC laboratories have agreed to work together to support DOE in streamlining agreements for the Office of Industrial Technologies IOF program within the framework of accepted DOE practices.

Because of differences in the management contracts of the government-owned, contractor-operated laboratories and their parent DOE offices, each laboratory has had its own business terms and conditions. In order to promote a standard agreement format, the LCC laboratories agreed to work on uniform conditions for working with industry in the IOF program.

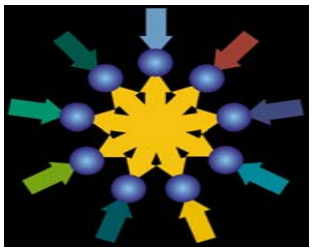
There are three ways of working formally with the laboratories. They include the modular Cooperative Research and Development Agreement (CRADA) and a common Work for Others agreement (WFO). In addition, the laboratories have many unique user facilities and specialized capabilities available to industry. Personnel exchanges are another avenue available for collaboration, and other possibilities can be pursued. It is also possible for a laboratory to work directly with industry using funds they receive through a Field Work Proposal (FWP). The FWP is a mechanism by which DOE authorizes funding for laboratory programs.

Instead of using agreements created for each program, as was done in the past, DOE has established that the modular CRADA is the preferred way of doing business. At the same time, the laboratories are making progress toward a uniform interpretation and application of terms and conditions. Figure 1 illustrates the process within the IOF program.

The LCC gives industry access to a "virtual" laboratory that can be tailored to meet the specific requirements of almost any research need. Industry researchers no longer need to approach each laboratory separately to explore its capabilities and work out agreements. With their technical expertise, LCC teams constitute a valuable resource for industry to develop roadmaps of specific research activities that will help them achieve their vision.

This publication includes information on how to work with laboratories and describes the LCC participants, the national laboratories, other laboratories, and facilities. There is also detailed information on patent rights and other intellectual property. Some examples of past collaborations and history are included to facilitate understanding of working with DOE and its laboratories.

Figure 1



Partnering with Industries of the Future

Collaborative Projects

Mechanisms Available for Funding

Procurement Through DOE Field Offices to Private Sector

- **Financial Assistance**
  - Grants
  - Cooperative Agreements
- **Cost-Shared Contracts**

Mechanisms to Fund DOE Labs

- **DOE Funded Lab Research**
  - CRADA
  - User Facilities
  - Field Work Proposal
- **Industry Funded Work for Others**
- **Personnel Exchanges**

Ways to Work with the DOE Laboratories

Background

In 1995, a unique combination of national, federal, and special purpose laboratories and facilities entered into a Memorandum of Cooperation called the Laboratory Coordinating Council (LCC). The Council set a goal to facilitate industry access to the combined capabilities of the laboratories to support the IOF program. The LCC aimed to establish a clear, flexible structure to respond to major industries' research needs, and to work closely with industry to create a more competitive, energy-efficient future. The purpose of this document is to guide persons interested in taking advantage the laboratory resources and to answer questions about how the laboratories and DOE do business. The LCC represents a unique combination of national, federal, and special purpose laboratories and facilities formed to contribute to the IOF program, an undertaking of nearly $150 million in fiscal year 2000. Fourteen of the LCC DOE laboratories are government owned-contractor operated (GOCO) and two are government owned-government operated (GOGO). The key collaboration mechanisms are essentially the same for both.

The Council's objectives for the laboratories included:

- Support the IOF program.
- Support industry in developing technology roadmaps.
- Simplify access to laboratories and facilities through a clear, flexible structure that is responsive to needs.
- Stimulate and foster collaborations with industry and academia.

The LCC includes 16 laboratories. Eleven are national laboratories, 10 of which are GOCO laboratories and one is GOGO. The five remaining laboratories are special purpose laboratories with four GOCO and one GOGO, DOE operated. All the laboratories developed capabilities in response to the DOE's missions and responsibilities. Each DOE laboratory and facility has specific areas of excellence that were developed to support its DOE mission. Detailed information on these areas of excellence and how they relate to industry's needs will be found in the next section, **Participating Laboratories**. The laboratories play an active role in mission areas such as :

- Energy resources
- Science leadership
- Environmental quality
- National security

The capabilities and expertise developed in executing these and other functions have found direct application in collaborations with industries.

Working with the Laboratories

Companies have three common ways for collaborating with the GOCO laboratories. Table 1 summarizes the collaboration vehicles. They include CRADAs, WFO agreements, and user facility agreements. The way each of these ways work is briefly summarized here.

- CRADA - The private sector partner and the laboratory or laboratories work together, frequently with funds supplied equally by the partners.
- WFO - The private sector partner pays a laboratory to do a specified piece of work.
- User Facilities - The private sector partner pays for the use of laboratory facilities, usually with the participation of skilled laboratory personnel.

The GOGO laboratories operate with very similar CRADA and WFO mechanisms. GOCO laboratories are authorized to subcontract with industry and academia for work that complements the DOE mission.

CRADAs have been used for many years to formalize business–laboratory collaborations. The essence of a CRADA is that each collaborator contributes about equally to the research, development, or demonstration project. A partner's contribution might be labor, facilities, funds, or some combination of these. Many CRADAs were successfully completed, but in the early years there was criticism that CRADA terms and conditions varied significantly among the national laboratories. Such criticism led to the drafting in 1995 by DOE of a modular CRADA that established uniform conditions for doing business with its GOCO laboratories. A modular CRADA can involve one or more laboratories. For example, five laboratories implemented a CRADA that resulted in a 1997 R&D 100 Award for producing succinic acid from renewable resources for OIT. The language of the modular CRADA includes all the provisions from which industry may select and is referenced in Appendix 4.

WFOs enable businesses to employ the unique capabilities of a DOE laboratory. In this case funds will usually flow from the business to the laboratory as compensation for unique services provided. Special provisions provide for intellectual property rights and patent waivers. Typical language for a WFO agreement is referenced in Appendix 5.

The GOCO laboratories have user facilities that are available to industry for a fee. In such cases a business's employees will work with laboratory staff to apply that laboratory's specialized equipment to specific needs. To start, see table 2 for a laboratory having the desired expertise or, perhaps for convenience, a nearby laboratory. Page 16 contains a list of LCC members to contact at each laboratory. The Web site link at the top of page 16 provides additional contact information.

Another possibility for industry–laboratory collaborations lies in research solicitations issued by and for the IOF Program. The nature of these solicitations has varied widely, but many offer the opportunity for industry to partner with one or more laboratories. The extent of laboratory participation may be specified in some solicitations.

The DOE established the Technology Transfer Working Group (TTWG) as a standing working group reporting to the DOE R&D Council to review, develop, and integrate DOE technology transfer policies. Included in the group's charter are matters relating to intellectual property and CRADAs; coordinating implementation of recommendations; and ensuring the harmonization of CRADA and WFO policies, but not the day-to-day operational aspects of either mechanism. The TTWG is currently working to optimize the modular CRADA process. The modular CRADA, with its menu of options for industry, is the mechanism of choice for working with the DOE laboratories

Readers seeking detailed information on the methods for working with the laboratories including a discussion of intellectual property, will find an explanatory narrative in Appendix 1. **Information about Intellectual Property and Waivers**. Appendix 2 tells about the history and operations of the laboratories. Appendix 3. **Examples of Previous Department of Energy Collaborations with Industry**, provides some examples of how industry and the laboratories have worked together on previous research projects. Detailed language for the modular CRADA and WFO Agreement are referenced in Appendix 4 and Appendix 5. The text of these documents is lengthy, and those wishing to read the details may order a copy from the LCC at http://www.oit.doe.gov/lcc/.

Table 1. Research Contractual Mechanisms

Non-Federal Sponsors with Government-Owned Contract-Operated DOE Laboratories

	Description	Protection of Information	Intellectual Property	Industry Funding	DOE/Laboratory Funding	Comments
CRADA **Cooperative Research and Development Agreement**	A contract that establishes a partnership with industry for collaborative R&D activities.	The parties may protect (like a trade secret) their commercially valuable information for up to five years. The publishing party typically provides publication to the other party for review 30 days prior to intended publication. Review is for proprietary information and unprotected patentable information.	Each party retains title to its own inventions. For DOE laboratory inventions, the industrial partner is granted an option for a royalty-bearing exclusive license in a field of use for reasonable compensation.	Cost-shared through contributions of funds, personnel, equipment, services, or facilities. The DOE laboratory cannot pay funds to the industrial partner.	Cost-shared through contributions of funds, personnel, equipment, services, or facilities, and waiver of DOE depreciation and added factor charge. The DOE laboratory cannot pay funds to the industrial partner.	Requires technical collaboration by the industrial partner. Work must have a benefit to a DOE laboratory mission. Usually accompanied by a license or option agreement. Requires "substantial U.S. manufacture" of resulting products or services. DOE must approve "Joint Work Statement" and the CRADA before the work can begin. If 100% of the costs are paid by partner, WFO is an alternative. DOE must approve any substantive change to the CRADA.
Non-Federal WFO - Work for Others	A contract that provides industry, nonprofit institutions, and state and local governments access to the DOE laboratories' unique facilities, equipment, and personnel.	Data rights are negotiable, ranging from fully proprietary to all parties can use all data produced without restriction. Typically, the publishing party must provide publication to other party for review 30 days prior to intended publication. Review is for proprietary information and unprotected patentable information.	Title to DOE laboratory inventions usually goes to the sponsor under a DOE class waiver.	Pays full cost of DOE laboratory effort. Sponsor pays a DOE depreciation and added factor charge which has recently been reduced from 27% to 3%. A 30- to 90-day cash advance is required (depending on laboratory).	Industry sponsor pays full cost of laboratory effort. Some DOE laboratory overhead items could be reduced with the implementation of Domenici's bill (waiver of overhead costs related to security, waste clean up, etc.).	Includes sponsored R&D and unique analytical services. The work may not place a DOE laboratory in direct competition with the private sector. Work must be consistent with or complementary to a DOE laboratory's mission. DOE must approve the proposal and any substantive changes to the WFO agreement.
User Agreement	A contract that provides access to certain unique DOE laboratory experimental facilities for research, testing, and developing prototypes. Examples of National User Facilities include the Advanced Light Source and the Center for Electron Microscopy.	Negotiable. There are proprietary and nonproprietary agreements.	A DOE class waiver provides that inventions go to the user.	If the work is propri- etary, use of facilities requires full-cost reimbursement under the same rules as WFO. Reduction of overhead may also become possible (see WFO).	Use of facility is subject to availability as the work for the private sponsor cannot interfere with DOE laboratory programs.	The industrial partner directs the activity that occurs within the terms of agreement. DOE approval is not required. The work may not place a DOE laboratory in direct competition with the private sector.

Table 2. LCC Laboratories and Examples of Their Resources

Laboratory	Key Areas	Key IOF Areas
National Renewable Energy Laboratory, Golden, Colorado	Renewable energy Energy efficiency Science of renewableenergy Partnerships for market and technological development Biotechnology Bioenergy Biobased products	Forest products Agriculture Chemicals Chemometrics Technology transfer Special glass uses Sensors and controls
National Energy Technology Laboratory, Pittsburgh, Pennsylvania and Morgantown, West Virginia	Fossil energy resources Environmental management Fuel cells Power systems Coal preparation, use, and conversion	Agriculture Glass Mining Refining Steel Crosscutting (sensors and controls, and combustion).
Argonne National Laboratory, Argonne, Illinois	Basic sciences Scientific facilities Energy resources Environmental management	Chemicals Metals Refining Glass Forest products
Brookhaven, National Laboratory, Upton, Long Island, New York	Basic physical, chemical, and biological sciences Computing sciences Scientific facilities Energy technologies	Forest products Glass Chemicals Metals Crosscutting (sensors and controls, combustion)
Lawrence Berkeley National Laboratory, Berkeley, California	Basic physical, chemical, biological, and computing sciences Scientific facilities Energy technologies Environmental remediation	Forest products Glass Chemicals Metals Mining Cross cutting (sensors and controls, combustion)
Oak Ridge National Laboratory, Oak Ridge, Tennessee	Biotechnology and genetics Materials science and engineering Analytical and separation chemistry Biotechnology and genetics Nuclear physics Environmental systems Buildings, transportation, and utilities energy technologies	Agriculture Forest products Chemicals Metals Glass Petroleum refining
Pacific Northwest National Laboratory, Richland, Washington	National security Energy efficiency and renewable energy Environmentl management Fossil energy Basic sciences Scientific facilities	Agriculture Chemicals Forest products Glass Aluminum Sensors and controls

Laboratory	Key Areas	Key IOF Areas
Los Alamos National Laboratory, Los Alamos, New Mexico	Energy efficient technologies Computation and modeling Materials science Bioscience and biotechnology	Chemicals Catalysis Separations Glass Steel Sensors and controls Materials Petroleum refining
Lawrence Livermore National Laboratory, Livermore, California	National security Energy Renewable energy Energy efficiency Computation Manufacturing	Chemicals Steel Glass Forest products Combustion Sensors and controls Catalysis
Sandia National Laboratory, Albuquerque, New Mexico	National security Fossil, nuclear, and renewable energy resources Environmental quality Chemical, material, geophysical, and computational sciences	Chemicals Combustion
Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho	Applied environmental science and engineering Processing and management of radioactive and hazardous materials Engineered systems	Agriculture
Ames Laboratory, Ames, Iowa	Catalysis Synthesis, processing, and characterization of materials Coal cleaning Photosynthesis Environmental quality National security Laser technology Analytical tools and methods	Chemicals Glass Agriculture Forest products Metal casting
Savannah River Technology Center, Aiken, South Carolina	Environmental restoration Waste management Tritium Nonproliferation	Chemicals Sensors Metals Glass Membrane separations Waste processing Robotics Hydrogen storage Applied R&D Process development Actinide chemistry
Oak Ridge Y-12 Plant, Oak Ridge, Tennessee	Manufacturing technology National prototype center	Steel Chemicals Metal casting Sensors and controls Petroleum refining Forest products
Kansas City Plant, Kansas City, Missouri		
Albany Research Center, Albany, Oregon		

Frequently Asked Questions About Working With the Laboratories

Question #1: What is different about working with the DOE laboratories?

Answer #1: The DOE laboratories have diverse backgrounds. They were created to support the various missions of the Department, including energy, national security, science, and related environmental activities. Each government-owned, contractor-operated (GOCO) laboratory is managed through an independent contract between the lead DOE Headquarters organization, its implementing local DOE Field or Operations Office, and the respective laboratory's managing organization. DOE organizations include Energy Efficiency and Renewable Energy, Science, Defense mpanies, universities, non-profit institutions, or a consortium. The management contracts are subject to periodic review and evaluation, and re-competition. The combination of these elements can make it challenging to work with a DOE Laboratory. The Department also owns and operates laboratories (GOGOs) and other facilities that support specific DOE missions.

Several helpful activities have been undertaken to facilitate partnering with the Department:

1. A communications hub for accessing technology developed by DOE's network of research and development facilities - http://www.energy.gov/business/partners/techpartnergate.html
2. The creation of a technology transfer ombudsman at each of these laboratories - http://www.energy.gov/business/partners/ombuds.html
3. The creation of the Technology Partnerships Working Group (TPWG), consisting of technology transfer professionals from across the DOE complex to facilitate communications, share lessons learned, and streamline activities - http://www.lanl.gov/partnerships/tpwg/tpwg.html

Question #2: Are any steps being taken to streamline the various processes by which the private sector can work with the DOE Laboratories?

Answer #2: The Department is institutionalizing performance-based management through the activities of the DOE National Laboratories Improvement Council (http://labs.ucop.edu/internet/nlic/index.html), which is committed to a process of continuous improvement in program performance, environment, safety, health, and best business practices.

Specific examples of improvements are:

1. DOE reduced its depreciation and added factor from 27% to 3%. This change resulted from a review of policies on costs for laboratories to perform Work for Others outside the government system.
2. Many laboratories established benchmarks and reengineered their practices. Today simple agreements for user facilities can be done within a week if all the terms of the pre-approved agreement are acceptable to industry.
3. DOE streamlined agreements and has issued DOE Manual 483.1-1, which includes guidance for the negotiation and approval by DOE of all CRADAs. It includes a number of pre-approved clauses from which laboratories and companies/industry sectors can tailor an agreement.
4. Time to reach a CRADA agreement has been reduced. Preparation time includes writing a request for approval that includes a statement of work, negotiating terms and conditions, preparing the agreement, and review/approval by DOE. All of these activities have their own timetables. Essentially, a more complex agreement can extend the preparation time. When the partners are in agreement, the preparation time can be reduced.

- Many laboratories have executed CRADAs in less than a month instead of the more typical three to six months.
- See http://www.lanl.gov/partnerships/tpwg/success.htm for one example of a satisfied business customer after the CRADA process.

Question #3: Why does DOE retain government license and march-in rights?

Answer #3: Retention of these rights in CRADAs is required by law. The Government license is viewed as a recognition of the Government investment that created the facility and the background technology from which a CRADA arises. March-in rights are retained by the Government to assure that technology arising from laboratories is commercialized. Should a laboratory licensee or CRADA partner abandon commercialization, the government has the right to require the partner to license a third party, who is interested in commercializing the technology, at a reasonable royalty. These rights have never been exercised.

Question #4: How can companies protect their confidential and proprietary information while working with the DOE national laboratories?

Answer #4: Non-disclosure agreements can easily be put in place for initiating discussions related to creating a potential collaboration. Agreements to protect a partner's proprietary information can be executed prior to the initiation of any work. A company's proprietary information agreement template can be used, but use of the standard agreement offered by the national laboratory of interest often expedites the signature of these agreements. CRADAs normally contain provisions addressing protection of a partner's proprietary data. Data first produced in the performance of a CRADA can be protected from public release by the laboratory or the Government for five years. It is important that companies mark all the information that they provide to the laboratories' staff in accordance with the agreements between the parties for protection of data.

Question #5: How can the intellectual property interests of multiple collaborators be accommodated?

Answer #5: There are examples of successful multi-party collaborations that accommodated the interests of various organizations, including multiple DOE laboratories. Clear communications and up-front negotiations of intellectual property rights can help save time. For example, in the alternative feedstocks for chemicals program area, five laboratories set up sharing agreements of intellectual property among themselves and with a company. The intellectual property developed by one laboratory was used by other laboratories, and the company benefited from inventions at several laboratories.

Question #6: Why are liability provisions in user agreements of Management and Operating (M&O) contractors so complex and frequently different from conventional commercial provisions?

Answer #6: Government laboratories are taxpayer funded and self-insured, therefore, they must be limited in their ability to indemnify third parties.

Question #7: How can I contact the LCC or a specific national laboratory?

Answer #7: Look on the inside front cover of this document or look us up on the Internet at http://www.oit.doe.gov/lcc/ to find appropriate points of contact.

Question #8: Where can I find out about the capabilities and facilities of LCC members?

Answer #8: See Table 2 in this document and then contact the national laboratory of interest for more details. This information is also available on the Internet at http://www.oit.doe.gov/lcc/.

Question #9: Where can I find more information?

Answer #9: The web sites provided above are very good resources. Frequently asked questions and their answers have also been assembled by Sandia National Laboratories and Lawrence Berkeley National Laboratory:

1. http://corpbusdev.sandia.gov/Main/faq.htm
2. http://www.lbl.gov/Tech-Transfer/licensing/FAQ.html

Participating Laboratories

The Laboratories

Each DOE laboratory and facility has specific areas of excellence that were developed to support its DOE mission. The LCC is developing matrices of research and development (R&D) expertise at each LCC laboratory and facility. This supports each process industry — agriculture, aluminum, chemicals, forest products, glass, metalcasting, mining, petroleum, and steel. The expertise matrices are available through the LCC web site (www.oit.doe.gov/lcc/). Figure 2 shows the locations of the laboratories.

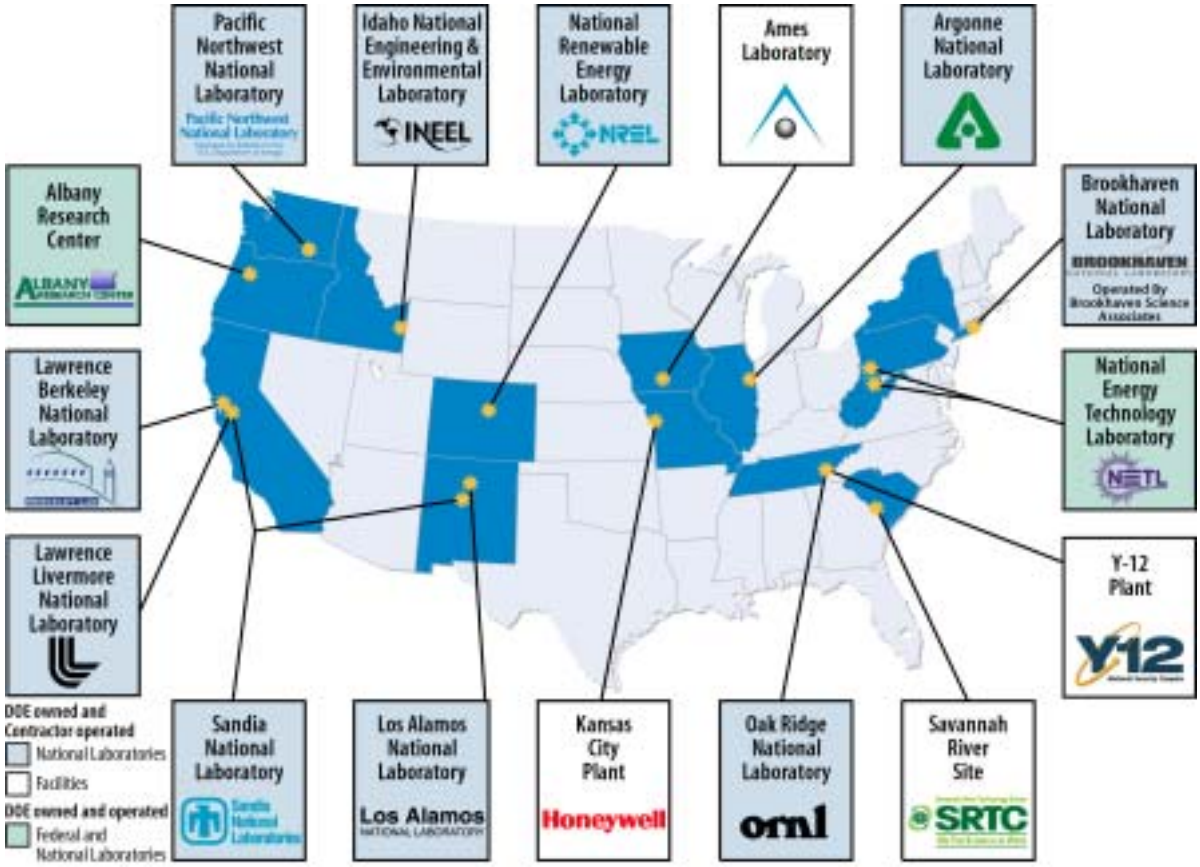


Figure 2 **DOE Laboratories of the Laboratory Coordinating Council**

Table 3 depicts the 11 national laboratory members of the LCC. Even though all the laboratories have a primary sponsoring DOE office, they also contribute to, or participate in, technology development programs for other DOE programs. Most do some work for the Office of Energy Efficiency and Renewable Energy, and all have large, leading-edge, user facilities available to industry and academia.

Table 3. Eleven National Laboratories of the Laboratory Coordinating Council

DOE Office	National Laboratory	Address	Phone	Web Page
Energy Efficiency and Renewable Energy	National Renewable Energy Laboratory (NREL)	1617 Cole Blvd. Golden, CO 80401	303-275-3000	www.nrel.gov
Fossil Energy	National Energy Technology Laboratory (NETL)*	626 Cochrans Mill Road, P.O. Box 10940 Pittsburgh, PA 15236 and 3610 Collins Ferry Road, P.O. Box 880 Morgantown, WV 26507	412-892-6000 and 304-285-4764	www.netl.doe.gov
Science	Argonne National Laboratory (ANL)	9700 S. Cass Avenue Argonne, IL 60439	630-252-2000	www.anl.gov
	Brookhaven National Laboratory (BNL)	P.O. Box 5000 Upton, NY 11973	516-344-8000	www.bnl.gov
	Lawrence Berkeley National Laboratory (LBNL)	1 Cyclotron Road Berkeley, CA 94720	510-486-4000	www.lbl.gov
	Oak Ridge National Laboratory (ORNL)	One Bethel Valley Road, P.O. Box 2008 Oak Ridge, TN 37831	423-574-4168	www.ornl.gov
	Pacific Northwest National Laboratory (PNNL)	P.O. Box 999 Richland, WA 99352	509-375-2121	www.pnl.gov
Defense Programs	Lawrence Livermore National Laboratory (LLNL)	7000 East Avenue Livermore, CA 94550	925-422-1100	www.llnl.gov
	Los Alamos National Laboratory (LANL)	P.O. Box 1663 Los Alamos, NM 87545	505-667-5061	www.lanl.gov
	Sandia National Laboratories (SNL)	P.O. Box 5800 Albuquerque, NM 87185 and P.O. Box 69 Livermore, CA 94551	415-422-2140 and 505-845-0011	www.sandia.gov
Environmental Management	Idaho National Engineering and Environmental Laboratory (INEEL)	P.O. Box 1625 Idaho Falls, ID 83415	208-526-0011	www.inel.gov

* NETL is government owned and operated. All others are government owned and contractor operated.
Other LCC members include four special purpose facilities and a single purpose laboratory that is government owned and operated. These appear in Table 4.

Table 4. Facilities, Special Purpose, and Federally Operated DOE Laboratories of the Laboratory Coordinating Council

DOE Office	National Laboratory	Address	Phone	Web Page
Office of Science	Ames Laboratory (initially for high-purity uranium)	130 Spedding Hall Ames, IA 50011	515-294-2770	www.external.amesl ab.gov
Defense Programs	Kansas City Plant	2000 East 95th Street P.O. Box 419159 Kansas City, MO 64141	816-997-2000	www.kcp.com
	Oak Ridge Y-12 Plant (part of Oak Ridge Centers for Manufacturing Technology [ORCMT])	P.O. Box 2009 Oak Ridge, TN 37831	1-800-356-4872 (ORCMT)	www.y12.doe.gov/.i ndex.html
Environmental Management (54%); Defense Programs (21%)	Savannah River Site	Savannah River Technology Center, Building 773-A Aiken, SC 29808	803-725-3471	www.srs.gov
Fossil Energy Programs	Albany Research Center (ARC) (formerly with the Bureau of Mines; now a materials research facility)	1450 Queen Avenue, SW Albany, OR 97321	541-967-5893	www.alrc.doe.gov

The combined list of 16 laboratories in Tables 3 and 4 is part of the DOE laboratory system of about 30 laboratories in 16 states. Their combined budgets exceed $6 billion provided by the DOE offices sponsoring the work conducted at those facilities. The scientific and technical staff numbers close to 30,000. These facilities range from small, specialized laboratories with annual funding of less than $5 million per year to large, diversified laboratories with annual operating budgets exceeding $1 billion. Collectively, the laboratories are the major operational arms of DOE, performing a significant fraction of the R&D that Congress, through authorization and appropriation bills, directs and funds DOE to perform.

The Laboratory Coordinating Council

The LCC represents a unique combination of national, federal, and special purpose laboratories and facilities formed to contribute to the IOF program, an undertaking of nearly $150 million in fiscal year 2000. In 1995, these laboratories entered into a Memorandum of Cooperation. The goal was to facilitate industry access to the combined capabilities of the laboratories. The LCC set out to establish a clear, flexible structure to respond to major industries' research needs. They targeted working closely with industry in creating a more competitive, energy-efficient future through streamlined identification of capabilities, common arrangements of intellectual property, and WFOs. The Council's objectives for the laboratories included:

- ***Support the IOF Program***. This OIT program focuses on the nine most energy- and waste-intensive industries in the United States. The 16 DOE laboratories and facilities of the LCC help these industries meet their goals of reducing energy use and waste.

- ***Support industry in developing technology roadmaps***. With their technical expertise, LCC teams work with industry to develop roadmaps of specific research activities that will help achieve the goals of industry.

- ***Simplify access to laboratories and facilities through a clear, flexible structure that is responsive to needs.*** The LCC gives industry access to a "virtual" laboratory that can be tailored to meet the specific requirements of almost any research project. Industry researchers no longer need to approach each laboratory separately to explore its capabilities and work out agreements. The laboratories now function in a distributed manner through common intellectual property agreements and other mechanisms.

- ***Stimulate and foster collaborations with industry and academia.*** DOE's IOF program created vision documents explaining goals and technology roadmaps describing R&D priorities that will help them reach those goals. This process has created a common understanding of industry's R&D needs that the broad research community—national laboratories and facilities, universities, and industry—can address.

The new arrangement provides for more transparent and efficient negotiations between industries and the participating laboratories.

Laboratory Management

Outside contractors manage all but two of the DOE laboratories in the LCC. Private sector research operations are usually internally managed and staffed, but the DOE relies on contractors to perform this function. Using outside management may be related to the original decision to place atomic energy under civilian control. Thus, laboratory personnel are employees of private sector organizations that manage and operate 10 of the 11 national laboratories. The private sector operators may be nonprofit, not-for-profit, or for-profit entities. DOE awards a contract to each operator for a specified period of performance. A contract may be renegotiated or, eventually, rebid at the end of the contract period.

Contractor operators of national laboratories perform their functions quite autonomously. However, DOE retains direction and oversight through field offices to which each laboratory is assigned. The DOE field offices report, in turn, to one or more program offices at DOE headquarters. Additional detailed information on laboratory management appears in Appendix 2.

References and Resources

Laboratory Coordinating Council Contacts for the Year 2002

An up-to-date list of contacts can be found on the Web at http://www.oit.doe.gov/lcc/contacts.shtml.

Albany Research Center
William Riley riley@alrc.doe.gov

Ames Laboratory
Dave Hoffman hoffman@ameslab.gov

Argonne National Laboratory (ANL)
1996 Chair-William Schertz schertzww@anl.gov

Brookhaven National Laboratory (BNL)
Michael J. Sebastino sebastino@bnl.gov

Idaho National Engineering and Environmental Laboratory (INEEL)
Marty Sorensen sms2@inel.gov

Kansas City Plant
Jack Quint jquint@kcp.com

Lawrence Berkeley National Laboratory (LBNL)
Don Grether DFGrether@lbl.gov

Lawrence Livermore National Laboratory (LLNL)
Robert S. Glass glass3@llnl.gov

Los Alamos National Laboratory (LANL)
Melissa Miller mami@lanl.gov

National Energy Technology Laboratory (NETL)
Jose Figueroa jose.figueroa@netl.doe.gov

National Renewable Energy Laboratory (NREL)
1997 Chair-Helena Chum Helena_Chum@nrel.gov

Oak Ridge National Laboratory (ORNL)
Pete Angelini Angelinip@ornl.gov

Pacific Northwest National Laboratory (PNNL)
1999-2001 Chair-Steven C. Weiner sc.weiner@pnl.gov

Sandia National Laboratories SNL)
Bill McLean bill_mclean@sandia.gov

Savannah River Technology Center
Ed Danko edward.danko@srs.gov

Y-12 Plant
Janice West Christman AAW@y12.doe.gov

DOE Research and Development Portfolio, Energy Resources Portfolio, Vol 2 of 5, 1999. See also Report on DOE Strategic Planning, R&D Integration, Portfolio Analysis, & Roadmapping, available at http://pnl113.pnl.gov/erdoclib.nsf under Marlay, Krebs, Kripowiz, Houghton, Divone, respectively, for the R&D portfolio approach at DOE, Office of Science, Fossil Energy, Carbon Sequestration program, and the Office of Industrial Technologies of Energy Efficiency and Renewable Energy.

http://www.energy.gov/aboutus/history/mission.html

http://www.energy.gov/HQDocs/hr105749.pdf

Report to the Committee on Appropriations pursuant to FY1999 Energy and Water Appropriations Act - Conference Report (H. Rept. 105-749)

www.oit.doe.gov/lcc/	Laboratory Coordinating Council
www.nrel.gov	National Renewable Energy Laboratory
www.netl.doe.gov	National Energy Technology Laboratory
www.anl.gov	Argonne National Laboratory
www.bnl.gov	Brookhaven National Laboratory
www.lbl.gov	Lawrence Berkeley National Laboratory
www.ornl.gov	Oak Ridge National Laboratory
www.pnl.gov	Pacific Northwest National Laboratory
www.llnl.gov	Lawrence Livermore National Laboratory
www.lanl.gov	Los Alamos National Laboratory
www.sandia.gov	Sandia National Laboratories
www.inel.gov	Idaho National Engineering and Environmental Laboratory
www.external.ameslab.gov	Ames Laboratory
www.kcp.com	Kansas City Plant
www.y12.doe.gov/.index.html	Oak Ridge Y-12 Plant
www.srs.gov	Savannah River Site
www.alrc.doe.gov	Albany Research Center

www.lanl.gov/partnerships/tpwg/tpwg.html

www.oit.doe.gov/lcc/lccactivities.shtml

http:/www.osti.gov/html/doe/whatsnew/labopbd/replob.html

APPENDIX 1. Information about Intellectual Property and Waivers

Statutes That Govern the DOE's Intellectual Property Policies

Section 152 of the Atomic Energy Act of 1954, as Amended

DOE, like its predecessors the AEC and the Energy Research and Development Administration (ERDA), is a "title" agency with respect to inventions made while performing its R&D activities. This means that DOE is required to take title in each invention made while performing its R&D activities—unless it waives the government's title rights, or the funding agreement is with a small business (500 or fewer employees)or nonprofit organization.

The first DOE patent statute is Section 152 of the Atomic Energy Act of 1954, as amended (PL 83-703). Under this statute, title to any invention useful in producing or using special nuclear material or atomic energy made or conceived during the course of or under a contract vests in DOE, unless DOE waives these rights.

Section 9 of the Federal Non-Nuclear Energy Research and Development Act of 1974 (PL 93-577)

The second DOE patent statute is found in Section 9 of the Federal Non-Nuclear Energy Research and Development Act of 1974 (PL 93-577). Title to any invention made during the course of or under any contract with ERDA (now DOE) vests in the government, unless waived by DOE.

These statutes provide the Secretary of Energy broad latitude and discretion to mold the intellectual property rights disposition to a contract situation by exercising the waiver authority. For DOE to waive the government's rights to inventions made with taxpayer funds, the Secretary must determine that a waiver is in the best interest of the United States and the general public.

Four broad objectives guide the Secretary in making a waiver determination.

- Make the benefits of DOE's energy RD&D widely available to the public in the shortest practicable time.
- Promote the commercial use of such inventions.
- Encourage participation by private persons in DOE's energy RD&D programs.
- Foster competition and prevent undue market concentration or the creation or maintenance of other situations inconsistent with the antitrust laws.

DOE was given broad discretion in waiving the government's rights in inventions. However, Congress attached certain "strings" to every invention waived by DOE. These include:

- A worldwide, nonexclusive, irrevocable, paid-up license to use the waived invention on behalf of the government
- Certain march-in rights.

Industry seldom understands that these two reservations may apply.

Bayh-Dole Act (PL 96-517)

The third DOE patent statute requires all federal agencies to grant to small businesses and nonprofit organizations the first right to elect title to inventions arising under their funding agreements. Unlike the first two statutes, this right begins at the time of contracting. There is no requirement for a "best interest" determination. The right of a small business or nonprofit organization to elect to retain title to any invention is automatically available when it executes the contract.

DOE or its M&O contractors must give small business or nonprofit organizations the right to elect title to inventions arising under any funding agreement such as a subcontract. The Bayh-Dole law is also important for any nonprofit or not-for-profit organization that manages and operates one of DOE's national laboratories. In such cases, inventions arising from the performance of the M&O contract are subject to Bayh-Dole, giving the nonprofit organization the first option to elect title to such inventions.

What Governs the Department of Energy's Patent Waivers?

General Criteria

DOE set forth the statutory criteria for determining that a waiver of the government's right to inventions will best serve the interests of the United States and the general public. The extent to which the non-federal party is willing to substantially cost share (at least 20%) in the research effort has been the predominant justification for waiver grants.

DOE has extensively used its broad waiver authority in contracting for R&D work, mostly in individual cooperative agreements and contracts where the non-federal party agreed to cost-share in the research, and in cost-shared subcontracts of its M&O contractors.

Beginning in the early 1980s, DOE granted a series of class waivers designed to make the unique technical resources and facilities in its national laboratories more user friendly to industry and academia, and to encourage wider use of national resources and facilities. DOE directed the class waivers to a group of contract situations or a group of facilities having a common characteristic. This enabled DOE to greatly expedite the time for processing waiver petitions when a group of contracts or facilities could be identified as a candidate for a class waiver determination.

Work for Others

The first WFO agreement was a class patent waiver of inventions made by sponsors and M&O contractors arising from any WFO agreement entered into by the M&O contractor. The sponsor could automatically elect title to any invention made by the M&O contractor in performing the agreement; the waiver also covered any invention of the sponsor for which the sponsor was performing research under the agreement.

DOE issued a guidance document (DOE G 481.1) to improve the processing time for WFO agreements and provide more flexibility in disposing rights to inventions. The policy set forth in the guidance document allowed the DOE field offices, for the first time, to delegate (upon approval of a laboratory management plan) to the M&O contractor the authority to make the determinations and execute the WFO agreement.

The policy also granted greater flexibility in the disposition of rights to inventions by identifying three situations that permitted the M&O contractor to elect to retain title to any invention made, instead of the sponsor having the election to retain title:

- Where work might result in an invention that is a research tool
- Where the sponsor is owned or controlled by a foreign organization
- Where the sponsor's field of use is limited

User Agreements

The second waiver was for inventions made while performing research in certain designated user facilities. It granted to the user the right to retain title to any inventions made while performing the Use of Facilities Agreement (UFA) because the user was entering the designated user facility to conduct research. This was in contrast with the class patent waiver for WFO agreements, in which inventions of either the sponsor or the M&O contractor made during the performance of the agreement were included in the scope of the class patent waiver.

Most of the national laboratories have established standard user agreements (nonproprietary or proprietary) that implement the DOE class patent waiver and grant the user the right to retain title to any invention made by the user while performing the agreement. The standard user agreement also contains technical data provisions that permit the user to mark and remove technical data that qualify as proprietary data of the user. It also contains other terms and conditions, including a liability provision, for conducting the research.

Cooperative Research and Development Agreements

Another class patent waiver granted by DOE-covered inventions made by employees of a participant and the M&O contractor arising out of a CRADA. DOE implemented PL 101-189 to permit the M&O contractors to enter into CRADAs.

DOE granted a class waiver covering inventions made under CRADAs with its M&O contractors to facilitate the placement of CRADAs by its M&O contractors under this new authority. This would also take advantage of the technology transfer capability of the M&O. The M&O contractor (nonprofit or for-profit) had the right to elect title to inventions of its employees, and the participant had the right to elect title to inventions made by its employees.

The class patent waiver encouraged wider participation by the private sector in CRADAs, but the parties encountered delays caused by lengthy negotiations about the terms and conditions. As part of its commitment to Congress to streamline the CRADA process, DOE issued a "modular CRADA," along with criteria, to be used by its M&O contractors in CRADA negotiations. The modular CRADA published for the first time DOE's full range of pre-approved terms and conditions, including a title to inventions article, available for use with industry and academia. This is the preferred mode of operation today.

Steel Initiative

PL 99-199 authorized the Steel Initiative Program. A large part of the R&D was expected to be conducted at DOE's national laboratories, many of which were run by nonprofit organizations. These organizations would ordinarily be entitled to elect to retain title to inventions made under their research work. Additionally, DOE expected to award contracts and subcontracts to domestic companies, which could be small businesses or nonprofit organizations that would ordinarily be entitled to retain title to their inventions.

In order to avoid a fractured ownership of technologies under the Steel Initiative Program, DOE issued an Exceptional Circumstances Determination directed to its funding agreements awarded in that Program. The Exceptional Circumstances Determination provided that small businesses and nonprofit organizations performing work in the Steel Initiative Program would not automatically obtain title to their inventions. Rather, DOE would permit, through an advance patent waiver, title to these inventions to flow to a private concern or concerns, which would hold title for the beneficial interests of the participants in projects under the Steel Initiative Program.

Congress (PL 100-680) expanded the original Steel Initiative Program to cover R&D in steel, aluminum, and copper process technologies and was known as DOE's Metal Initiative. The advance patent waiver granted for the Steel Initiative was subsequently expanded to cover the Metal Initiative.

Cost-Shared Subcontracts

DOE has indicated in its published waiver regulations that substantial cost sharing by the contractor (or subcontractors) is a justification for granting of an advance patent waiver. DOE has not, however, used its broad waiver authority to grant a class patent waiver for cost-shared contracts, except in the High Temperature Superconductivity Pilot Program. In the absence of such a class patent waiver, cost-shared subcontracts are handled case-by-case. This requires a waiver petition to be submitted by the subcontractor to the M&O contractor, the local patent counsel preparing a Statement of Considerations, and DOE Headquarters granting the waiver. This is time consuming and inefficient. It can also delay execution of the subcontract and start of the research work.

Management and Operating Contracts

DOE granted a class patent waiver for inventions made by employees of its for-profit M&O contractors. Because more than 90% of the inventions made under DOE's R&D contracts arise in the performance of M&O contracts, the class patent waiver greatly simplified the process by which inventions were made available for commercialization. The waiver enabled the M&O contractors to promote the early commercialization of inventions through a licensing program. By granting title to each elected invention, the M&O contractor could, in turn, offer third parties nonexclusive or exclusive licenses on a royalty-bearing basis. The government license and government march-in rights were retained in each waived invention. Also, commitments to meet the U.S. competitiveness provision of the technology transfer contract amendment were secured in each license agreement.

Other Laws That Govern DOE's Technology Transfer Policies

Stevenson-Wydler Act and Amendments

In addition to these statutes governing DOE's patent policy, Congress in the 1980s enacted several laws that required federal agencies to actively pursue the transfer of technology from their national laboratories and facilities. This was in response to U.S. industry's losing its competitive edge in domestic and global markets in specific areas. Therefore, to reverse the downward spiral engulfing U.S. industry, Congress placed great emphasis on agencies and their national laboratories and facilities to transfer taxpayer-financed technology to the private sector. This would enhance the ability of U.S. industry to compete with foreign firms in U.S. and foreign markets.

The first enactment was the Stevenson-Wydler Technology Innovation Act of 1980 (PL 96-480). The Act stated that the policy of the federal government was to strive to transfer federally owned or originated technology to the private sector. It also emphasized that the results obtained from the government's investment in R&D should be used for the public good.

The 1980 Act was amended in several important aspects with the passage of the Federal Technology Act of 1986 (PL 99-502). It created an entirely new contracting vehicle, the CRADA, for use by federal agencies in carrying out cooperative research. The CRADA was for use in GOGO facilities, e.g., DOE's Federal Energy Technology Center, now the National Energy Technology Laboratory (NETL)..

Also, the 1980 Act was amended by PL 98-620, which extended the provisions of Bayh-Dole to big businesses, particularly with reference to the government-retained license, government march-in rights, and preference for U.S. industry.

In 1989 the National Competitiveness Technology Transfer Act (PL 101-189) extended the authority to enter into CRADAs to GOCO facilities, e.g., DOE's national laboratories. A second amendment created a statutorily exempt category of information created under the CRADA, i.e., agencies were permitted to withhold CRADA-developed information from public dissemination for as long as 5 years, including Freedom of Information Act requests. Equally important, another amendment mandated that technology transfer was a mission of each national laboratory contract.

In addition to the retained rights of a paid-up government license and government march-in rights, DOE has implemented PL 98-620, requiring all waivers be subject to the "Preference for United States Industry." Also, DOE's technology transfer policy imposes a "U.S. Competitiveness Provision" that attaches to each CRADA invention. Under this provision, the contracting party agrees that any products, processes, or services for use or sale in the United States under any U.S. patent resulting from an invention (or intellectual property in the case of a CRADA) shall be manufactured substantially in the United States.

DOE has shown some flexibility in the requirement of the standard clause in a number of its major partnerships with private industry. DOE's experience is that it has provided sufficient guidance for use of this provision to be able to mold cooperative research.

Complaint Mechanism

DOE instituted an Ombudsman program to facilitate complaint processing. This is being handled through the DOE Technology Transfer Working Group that was created to streamline and facilitate technology transfer across the DOE laboratory complex. The web site can be viewed at http://www.er.doe.gov/production/octr/aeptr/ttwg.htm .

APPENDIX 2. Laboratory Roles, Operations, Contributions, and Accomplishments

Laboratory Roles and Contributions

The laboratory responsibilities and activities evolved from the DOE missions. The origins of the Department can be traced to the research project to develop an atomic bomb during World War II. In 28 months the defense laboratory complex involved in this Manhattan Project produced the first bomb. Congress debated civilian versus military control of atomic energy following the war. The Atomic Energy Act of 1946 created the Atomic Energy Commission (AEC) to administer and regulate the production and use of atomic power.

During the early Cold War years, the Commission focused on designing and producing nuclear weapons and developing nuclear reactors for naval propulsion. The Atomic Energy Act of 1954 ended exclusive government use of the atom and began the growth of the commercial nuclear power industry, giving the AEC authority to regulate the new civilian industry. The AEC was abolished when the Energy Reorganization Act of 1974 created two new agencies: the Nuclear Regulatory Commission to regulate the nuclear power industry and the Energy Research and Development Administration to manage the nuclear weapon, naval reactor, and energy development programs.

A unified federal energy organization was created in response to the energy crisis of the 1970s. The Department of Energy Organization Act brought the federal government's energy-related agencies and programs into a single operating department on October 1, 1977. The new DOE provided the framework for a comprehensive national energy plan by coordinating and administering the energy functions of the federal government. The DOE undertook responsibility for:

- Long-term, high-risk R&D of energy technology
- Federal power marketing
- Energy conservation
- The nuclear weapons program
- Energy regulatory programs
- Central energy data collection and analysis

The DOE laboratories developed capabilities in response to these various missions and responsibilities.

Energy Resources

DOE works to ensure clean, affordable, and dependable supplies of energy for our nation. Strategies used to achieve this goal include:

- Increase the diversity of energy and fuel choices and sources
- Bring renewable energy sources into the market
- Increase energy efficiency throughout the economy
- Strengthen domestic production of oil and gas
- Support commercial nuclear energy research

Science Leadership

Breakthrough research is conducted in energy sciences and technology, high energy physics, superconducting materials, accelerator technologies, material sciences, and life and environmental sciences. This research fosters understanding of nature's building blocks; from quarks and high energy physics to the properties of light and the structure of atoms; from simple materials to complex genomic materials of life.

Environmental Quality

Driven by high environmental standards and strict legislation, DOE uses its scientific and technical expertise to respond to the challenge of cleaning up environmental contamination from more than 50 years of nuclear weapons production during times of less strict regulation. Cleanup involves the safe treatment, storage, and final disposal of radioactive wastes, surplus nuclear materials, and spent nuclear fuels that remain at the nation's nuclear weapons facilities and at some energy R&D sites.

National Security

Through its defense laboratories, DOE maintains the safety, security, and reliability of the U.S. nuclear weapons stockpile. DOE also manages the safe dismantling of surplus nuclear weapons; disposes of surplus fissile nuclear materials; and ensures the security of U.S. nuclear assets. DOE and its laboratories provide technical assistance to curb global proliferation of weapons, emphasizing U.S. nonproliferation, arms control, and nuclear safety objectives worldwide.

Contributions and Accomplishments

Here are some examples of the laboratories' recent scientific and technological breakthroughs that resulted from DOE's wide range of activities.

Examples of Breakthroughs Originated in DOE Laboratories

- Genomic sequencing that confirmed a new, third branch of life on Earth—a deep ocean, methane-producing organism with commercial applications
- World record for sustained fusion reaction both in length of reaction and peak energy
- Improved high-temperature superconductors through research into pairing mechanisms and vortex physics
- New ways to potentially store hydrogen through the discovery of new graphite nanofibers that can store three times their weight of hydrogen
- Computational ability that recently exceeded 1 teraflop (one trillion operations per second) in sustained performance for an application
- Artificial photosynthesis through research into light-matter interactions and proteon motive force
- Collaboration in the development of a photovoltaic cell that holds three world records for efficiency
- Improved miniaturization through research into nanowires: "magic structures" and conductance quantization
- Improved models and measurements of the carbon cycle, the phenomena of global warming and cloud formation
- A tenfold increase in the electrical conductivity of semiconductors through research into gallium injection
- Development of the current generation of high energy and power lithium and lithium ion batteries from research into nonaqueous electrolytes
- Development and continuous refinement of increasingly sophisticated computers. From the Univacs of the 1950s to the supercomputers of today, the DOE laboratories have been a test-bed for the first model of nearly every new top-end computer. Driven initially by defense and fusion applications, these systems now are employed at the laboratories for applications including global climate modeling, human genome research, designing the next generation of fuel-efficient automobile engines, and modeling groundwater contamination.

Examples of Returns from Laboratory Activities:

- "For the Department of Energy and its laboratories, science and technology are the currency for meeting our mission requirements. The Laboratories support world-class scientists and engineers and unique, advanced research facilities which, help address complex, multi-disciplinary problems in areas ranging from national security to fusion energy to environmental clean-up. The research facilities at the Laboratories provide access for thousands of academic and industrial scientists to new frontiers in areas such as materials science and molecular biology. In this fashion, and by virtue of their distinguished record of scientific accomplishments, the Laboratories represent a National asset that warrants careful stewardship during an era when science holds the potential for addressing major national needs in health care, environmental quality, national security, and sustainable development. The Administration's new science policy provides the framework for helping sustain and guide the Department's scientific facilities and programs in the face of tight competition for resources. These facilities, like basic science in general, have provided a means of discovery and a record of technological innovation. The dividends of this investment will continue to accrue for generations to come."
  Conclusion of the *Alternative Futures for the Department of Energy Laboratories*, Galvin Committee Report

- Since the mid-1970s, DOE has invested $70 million in R&D at LBNL for developing advanced energy-efficient building technologies, software, and standards. That investment helped spawn a $2.4 billion U.S. market for key products, such as energy-efficient lighting and advanced window coatings. By 1993, the laboratory estimates that these developments saved the consumers about $5 billion in their energy bills. ("From the Lab to the Marketplace—Making America's Buildings More Energy Efficient," Prepared by LBNL, March 1995, PUB-758 [Rev 3/95].)

- Chapman Research Group surveyed users and industrial collaborators of NREL through 156 interviews in 1995. Respondents had formal (completed cost-shared subcontracts, CRADAs, licenses, or WFO Agreements) or informal relationships (technical assistance) with the Laboratory (more than 90% of contacted industry representatives responded). Among these, nearly three-fourths were able to estimate contributions toward sales or savings totaling more than $713 million, while leveraging company investments of more than $104 million. (Chapman, R.L.; Chapman, M.J. [1996]. Technology Transfer Tracking System for NREL: Overview and Results. 74 pp.; NICH Report No. TP-280-20880.)

- The DOE funded the research of 71 Nobel Prize winners. The research also resulted in 450 R&D 100 awards through 1998. This was more than any other single entity and twice as many as all other federal agencies combined.

Breakdown of R&D 100 Winners from 1980 to 1995

Total Winning Organizations--2017*

Private Companies—1306; Research Institutes—48; Universities--82

Government--629

NASA/JPL--71
NIST/NBS--60
Bureau of Mines (DCI)--26
DOD--24
Other--18
DOE--430
- Nuclear Energy (NE)--4 **
- Energy Research (ER)--145 **
- Fossil Energy (FE)--8 **
- Environmental Management (EM)--4 **
- Defense Programs (DP)--65 **
- Nuclear Nonprolif.(NN)--4 **
- Multiple program/other--101 **
- **Energy Efficiency and Renewable Energy (EE)—99** with 46 including DOE national laboratories as follows: NREL18; ANL, 8; ORNL, 6; SNL, 5; PNNL, 51; and LANL, LBNL, and BNL, 2 each.
  - Office of Power Technologies (OPT)--20
  - Office of Industrial Technologies (OIT)--14
  - Office of Building Technologies (OBT)--5
  - Office of Transportation Technologies (OTT)--12

* Joint Winners counted separately, resulting in more than 100 winners per year. There were 1600 total awards during this period.

** Estimates based on the February 1995 ORISE study

An example of a successful collaboration was a joint project with a small company and researchers at four DOE national laboratories: Oak Ridge National Laboratory (ORNL), Argonne National Laboratory (ANL), Pacific Northwest National Laboratory (PNNL), and the National Renewable Energy Laboratory (NREL) using the modular CRADA language. The 1997 R&D 100 award-winning process converts corn starch into inexpensive chemicals used to make a variety of consumer and industrial products. Not only was a common agreement used, but intellectual property developed in one laboratory was successfully used by other laboratories in the project and by the company. The collaboration started to build a patent portfolio for the technology.

Another successful collaboration involved a CRADA between laboratories, a university, and industry. This consortium undertook a fundamental study to improve energy efficiency and understand the underlying causes of toxic air emissions from industrial burners. Industry successfully used these results in negotiating environmental toxic air emission regulations. The industry partners cited this laboratory-industry partnership as an excellent example of government support to meet public needs.

Three technologies developed by DOE laboratory/industry partnerships were highlighted at the Burns Harbor Showcase Demonstration that the steel industry and the OIT organized in 1998: Sandia's sensors, Oak Ridge's nickel aluminide rolls, and their galvanneal temperature measurements. Laboratory-industry partnerships have been awarded many R&D 100 awards and recently, Green Chemistry Awards (1998 and 1999). The LCC web site details these and other success stories of working with the DOE Laboratories in the IOF program.

Appendix 3 offers examples of DOE collaborations with industry groups.

Operations

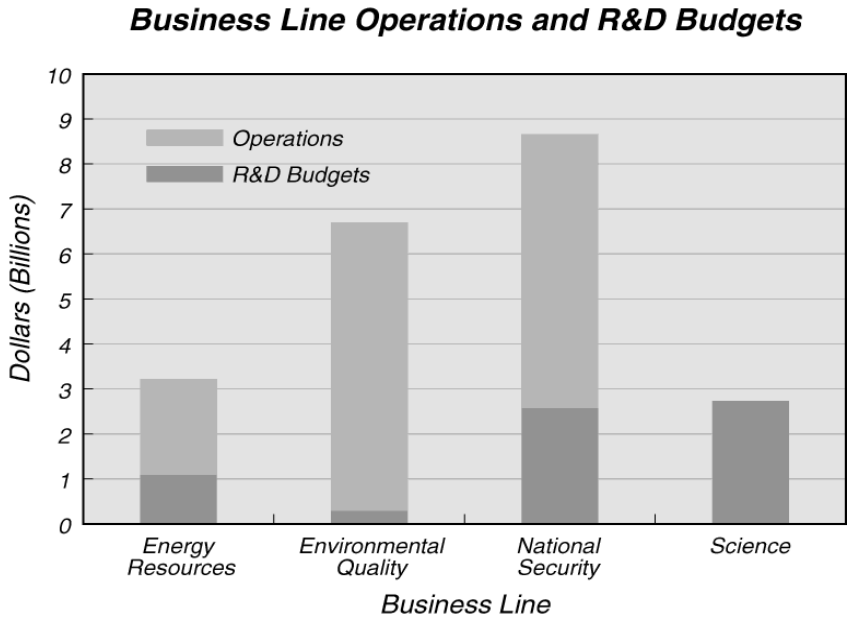
Table 5 shows the December 1999 status of contracting organizations for the 14 GOCO LCC members. The remaining two laboratories are owned and managed by DOE and are referred to as GOGO laboratories. These laboratories are the NETL and the Albany Research Center. They are shown together with all 16 LCC laboratories in Table 6.

Table 5. Government-Owned, Contract-Operated Laboratories and their Management Structure. Abbreviations of DOE Offices: EE = Energy Efficiency and Renewable Energy; SC= Science; DP = Defense Programs; EM = Environmental Management. Note that NETL, the newest national laboratory, is managed by DOE.

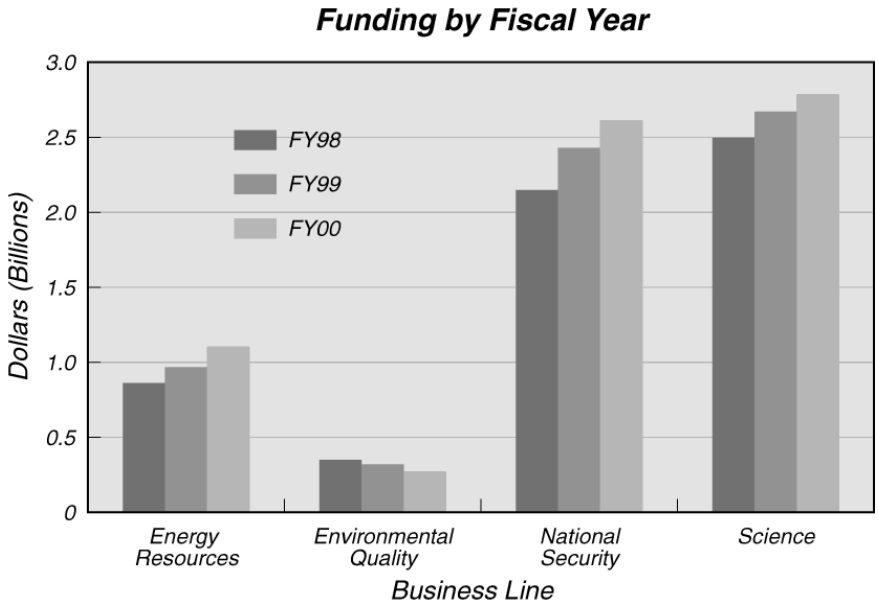
DOE Office / Laboratory	Operator	Contract Status*	DOE Field/Operations Office/DOE HQ reporting Office
EE/NREL	Midwest Research Institute, Battelle and Bechtel	1998-2002	Golden/EE
SC/Argonne	University of Chicago	Renegotiate 2001	Chicago/SC
SC/BNL	Brookhaven Science Associates (Battelle Memorial Institute & Research Foundation State University of New York -Stony Brook)	1997-2001	Chicago/SC
SC/LBNL	University of California	Renegotiate 2002	Oakland/SC
SC/ORNL	UT- Battelle, LLC	2000-2004	Oak Ridge/SC
SC/PNNL	Battelle Memorial Institute	1997-2002	Richland/EM
DP/LLNL	University of California	Renegotiate 2002	Oakland Operations Office/DP
DP/LANL	University of California	Renegotiate 2002	Albuquerque/DP
DP/SNL	Lockheed Martin Corporation	1998-2003	Albuquerque/DP
EM/INEEL	Bechtel B&W Idaho, LLC (BBWI)	1999-2004	Idaho/EM
SC/Ames	Iowa State University	Periodic renegotiation	Chicago/SC
DP/Kansas City Plant	Allied Signal Federal Manufacturing & Technologies	March 2000	Albuquerque/DP
DP/SRS	Westinghouse Savannah River Company	Renegotiate 2001	Savannah River Operations Office/ EM
DP/Y-12 (Oak Ridge)	UT-Battelle, LLC	2000-2004	Oak Ridge/DP

*Note: DOE is assessing its field management structure in 1999. Changes may be considered. The Field Management Council, chaired by Deputy Secretary T.J. Glauthier, will implement DOE policy in areas such as environment, safety and health, safeguards and security, and business management. The Field Management Council is streamlining operations to increase effectiveness of the field offices. In addition, the Laboratory Operations Board was established by the Secretary of Energy in April of 1995 to provide focused, regular attention to issues facing DOE's laboratory complex (http:/www.osti.gov/html/doe/whatsnew/labopbd/replob.html).

The 1999 budgets devoted to supporting the business lines of DOE are shown in the following chart.

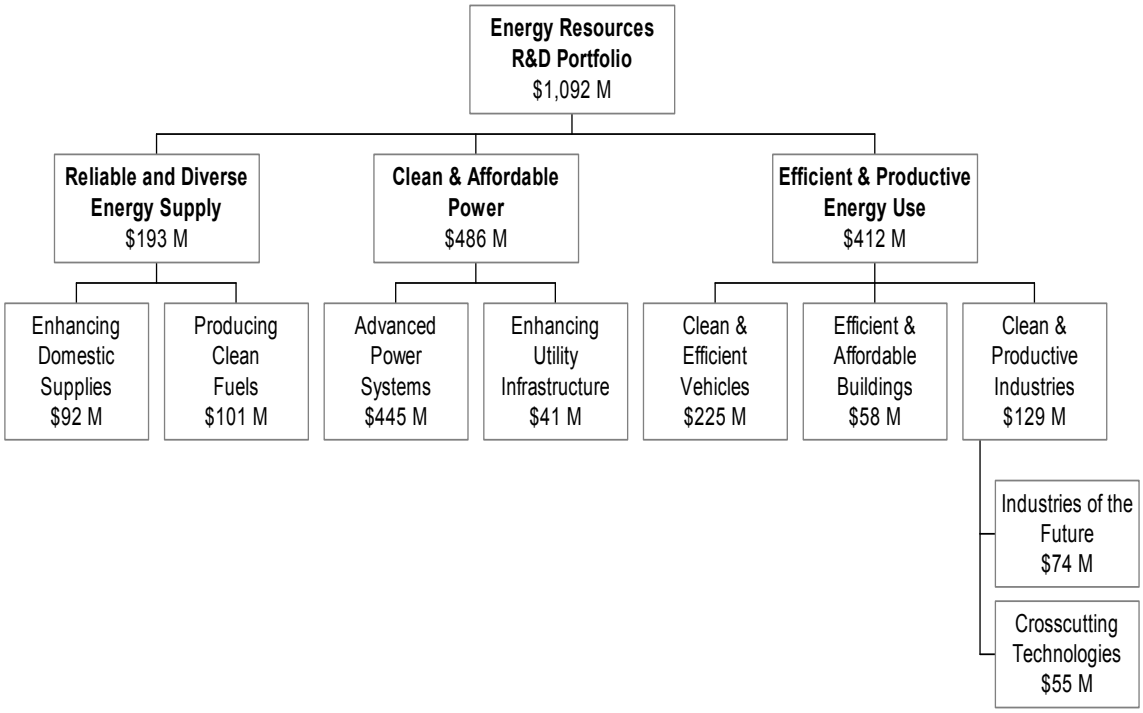


The R&D budgets of the past three years increased in Energy Resources, National Security, and Science.



The laboratories' share of Energy Resources funding is 30%–40% (40%–50% to industry, and 5%–20% to universities and not-for-profit groups). In the Office of Science, 73% of the R&D funding goes to laboratories (23% to universities and 4% to industry). In National Security, about 50% goes to defense laboratories (50% to weapons and other facilities and <1% to universities).

The IOF program appears in the DOE Energy Resources R&D Portfolio as part of its broad Efficient and Productive Energy Use goals. These goals address energy efficient, environmentally responsible, and productive industries. The overall Energy Resources activities and their funding are shown below for FY 1999.



The key strategic goals of the DOE's Energy Resources portfolio are:

- Improve the efficiency of the energy systems.
- Ensure against energy disruptions.
- Promote energy production and use in ways that respect health and the environment.
- Expand future energy choices.
- Cooperate internationally on global issues.

The LCC laboratories participate in the major business lines of DOE as described in Table 6. The table is based on data from the Strategic Laboratory Missions Plan, Volume II Mission Activity Profiles, July 1996, Laboratory Operations Board, the Galvin Report. There have been changes since 1996, but the table still reasonably depicts activities in the various laboratories according to the DOE missions.

The last column in Table 6 tells how each laboratory relates to major industries in the IOF program managed by the OIT in the DOE's Office of Energy Efficiency and Renewable Energy. This program aims to apply relevant technology from each of the 16 laboratories to the process industries within the program. This goal produced a list of core competencies and user facilities for each laboratory.

The selection of projects for the IOF program differs from in other parts of the DOE where the laboratories are key participants in the planning and portfolio analysis. The laboratories participate in IOF only as their capabilities are deemed relevant to needs identified by industry.

Table 6. LCC Laboratories and examples of their resources applied to Energy Resources (ER), Science (SC), National Security (NS), and Environmental Quality (EQ). DOE Offices: Science =SC; Energy Efficiency and Renewable Energy = EE; Fossil Energy = FE; Defense Programs = DP; Environmental Management = EM

DOE Office/ Laboratory	**DOE Operating Resources (1996) from the Galvin Report**					**Key Areas**	**Key IOF Areas**
Technical = scientists & engineers	Mi $	% ER	% SC	% NS	% EQ		
EE/NREL 350 technical/ 750 total	$180	98	2			Renewable energy Energy efficiency Science of renewable energy Partnerships for market and technological development Biotechnology Bioenergy Biobased products	Forest products Agriculture Chemicals Chemometrics Technology transfer Special glass uses Sensors and controls
FE/NETL	$571	94	0	0	6	Fossil energy resources Environmental management Fuel cells Power systems Coal preparation, use, and conversion	Agriculture Glass Mining Refining Steel Crosscutting (sensors and controls, and combustion).
SC/ANL 1,775 technical/ 4500 total	$475	31	45	7	17	Basic sciences Scientific facilities Energy resources Environmental management	Chemicals Metals Refining Glass Forest products
SC/BNL	$255	3	91	5	1	Basic physical, chemical, and biological sciences Computing sciences Scientific facilities Energy technologies	Forest products Glass Chemicals Metals Crosscutting (sensors and controls, combustion)
SC/LBNL	$292	19	78	0	3	Basic physical, chemical, biological, and computing sciences Scientific facilities Energy technologies Environmental remediation	Forest products Glass Chemicals Metals Mining Crosscutting (sensors and controls, combustion)
SC/ORNL	$440	46	42	7	5	Biotechnology and genetics Materials science and engineering Analytical and separation chemistry Biotechnology and genetics Nuclear physics Environmental systems Buildings, transportation, and utilities energy technologies	Agriculture Forest products Chemicals Metals Glass Petroleum refining

DOE Office/ Laboratory	DOE Operating Resources (1996) from the Galvin Report					Key Areas	Key IOF Areas
Technical = scientists & engineers	Mi $	% ER	% SC	% NS	% EQ		
SC/PNNL 2496 technical/ 3400 total	$488	23	14	13	50	National security Energy efficiency and renewable energy Environmental management Fossil energy Basic sciences Scientific facilities	Agriculture Chemicals Forest products Glass Aluminum Sensors and controls
DP/LANL	$1032	7	13	76	4	Energy efficient technologies Computation & modeling Materials science Bioscience and biotechnology	Chemicals Catalysis Separations Glass Steel Sensors and controls Materials Petroleum refining
DP/LLNL	$1000	11	16	62	11	National security Energy Renewable energy Energy efficiency Computation Manufacturing	Chemicals Steel Glass Forest products Combustion Sensors and controls Catalysis
DP/SNL	$1100	10	3	77	10	National security Fossil, nuclear, and renewable energy resources Environmental quality Chemical, material, geophysical, and computational sciences	Chemicals Combustion
EM/INEEL	$515	6	28	12	54	Applied environmental science and engineering Processing and management of radioactive and hazardous materials Engineered systems	Agriculture
SC/Ames 260 scientists	$22	5	79	0	16	Catalysis Synthesis, processing, and characterization of materials Coal cleaning Photosynthesis Environmental quality National security Laser technology Analytical tools and methods	Chemicals Glass Agriculture Forest products Metal casting

DOE Office/ Laboratory	DOE Operating Resources (1996) from the Galvin Report					Key Areas	Key IOF Areas
DP&EM /SRTC	$117	0	0	18	82	Environmental restoration Waste management Tritium Nonproliferation	Chemicals Sensors Metals Glass Membrane Separations Waste processing Robotics Hydrogen storage Applied R&D Process development Actinide chemistry
DP/Y-12 1000 technical/ 4000 total	$500			90		Manufacturing technology National prototype center	Steel Chemicals Metal casting Sensors and controls Petroleum refining Forest products
DP/Kansas City Plant	NA						
FE/ARC	NA						
Total/Avg	***$6987***	***26***	***36***	***26***	***18***		

APPENDIX 3. Examples of Previous Department of Energy Collaborations with Industry

This section reviews some industry collaborations with the laboratories.

Modular CRADA Origins

While the new CRADA authority gave DOE and its national laboratories a less cumbersome vehicle for carrying out collaborative research with the private sector, implementation of the CRADA process across the vast DOE laboratory complex has not been without its problems and attendant delays.

One problem encountered by the private sector was that the DOE's national laboratory system was not a seamless system. Rather, it comprised a series of separate M&O contracts that were operated by either nonprofit or for-profit entities, each with its own negotiation and licensing approaches to intellectual property that it owned or controlled. The TPWG (www.lanl.gov/partnerships/tpwg/tpwg.html), established by the laboratories, is working on this in collaboration with the laboratories and field office management to optimize and further streamline the CRADA process.

Beginning in the early 1990s, DOE streamlined the CRADA process in several major aspects. It issued a CRADA class patent waiver and a modular CRADA, which provided a full range of pre-approved terms and conditions and criteria to be applied when negotiating CRADAs.

DOE also negotiated master agreements, which established uniform CRADA terms and conditions, with various industrial sectors. These agreements enabled the private sector to go anywhere in the DOE laboratory complex and have jointly funded projects performed in a timely manner. However, DOE currently uses modular CRADAs instead. Descriptions of the master agreements are provided to describe the special circumstances that gave rise to these agreements.

National Center for Manufacturing Sciences

One of the earliest major R&D collaborative partnerships between DOE and the private sector was with the National Center for Manufacturing Sciences, Inc. (NCMS), a not-for-profit Delaware corporation.

This collaborative effort was implemented through a Memorandum of Understanding (MOU) between DOE and NCMS, signed on July 25, 1991. The objectives of the collaborative partnership were to:

- Advance the state of U.S. manufacturing sciences and to encourage the implementation of advanced technologies to improve the global competitiveness of U.S. manufacturing capabilities
- Improve and enhance DOE's capabilities through cooperative efforts.

Features of the MOU included:

- Establishment of a generic CRADA, the terms and conditions of which were agreed to in advance by DOE, its national laboratories, and NCMS, on behalf of its members' companies, for all CRADAs entered into between the national laboratories and NCMS.
- Incorporation of the CRADA class patent waiver in the approved generic CRADA, whereby each party to the CRADA was accorded the first option to elect to retain title to any invention(s) made by its employees.
- Approval of a generic Joint Work Statement for each area of technology proposed for the collaborative program.
- Establishment of individual Project Task Statements that incorporated the generic CRADA terms and conditions and served as a funding commitment for a given Scope of Work for initiating specific projects.
- Commitment by DOE to an expedited review period (i.e., five working days) for approval of the submitted Project Task Statements.
- Commitment by DOE and NCMS to a multi-year, jointly funded, collaborative research program.
- Establishment of management and program guidelines, including appointment of senior officials from DOE and NCMS as the primary point of contact.
- Formation of a Steering Committee to review and provide guidance for all programs and projects and to develop an annual overall work program.
- Inclusion of a U.S. Preference clause that imposed a "substantial manufacture" requirement for products for use or sale in the United States under any U.S. patent that may issue resulting from an invention, which arose from the performance of the CRADA.

AMTEX

The AMTEX Partnership™, a consortium of five R&D/educational institutions associated with the integrated textile industry, was another approach to facilitating an advanced understanding and agreement on a set of terms and conditions, including intellectual property rights disposition among the parties, that would govern subsequent cooperative projects. It brought together DOE, its national laboratories, and the integrated textile industry under a protocol agreement.

The mission and purpose of The AMTEX Partnership™ were to engage the unique technical resources of DOE's national laboratories to develop and deploy technologies that will increase the competitiveness of the integrated U.S. textile industry including fibers, fabric, and fabricated products.

The mission and purpose were to be accomplished through multiple CRADAs between DOE's national laboratories and the R&D/educational institutions associated with the integrated textile industry.

Features of the AMTEX Protocol and the Master CRADA and Option Agreement included:

- Authorization by DOE for each participating national laboratory to use the master CRADA in any cooperative projects identified in the AMTEX Program Plan.
- Agreement by the participating national laboratories to employ the master CRADA in all of their cooperative endeavors with the U.S. integrated textile industry.
- Commitment by AMTEX and DOE of substantial funding for the technology transfer projects identified by the parties in furtherance of The AMTEX Partnership.
- Agreement by the several Research, Education and Technology Transfer Organizations (RETTs) associated with the U.S. Integrated Textile Industry to use the terms of the master CRADA in any cooperative projects identified in the AMTEX Program Plan with DOE's national laboratories.
- Establishment of a process that identified key research needs of the U.S. textile industry and identified resources available in the laboratories to leverage R&D resources of the U.S. textile industry to better meet its technological needs, thereby increasing the competitiveness and long-term viability of the U.S. textile industry.
- Establishment of an agency relationship between the RETT and its member companies whereby research performed under any CRADAs pursuant to the AMTEX program plan by the member company was governed by the intellectual property provisions of the CRADA as if performed by the RETT.
- Grant of an option, at no cost, to enter into a license agreement by either the national laboratory or the RETT for an exclusive, worldwide, paid-up license to practice, including the right to sub license, in a defined field of use intellectual property owned solely by the granting party.
- Agreement on a royalty-sharing plan, jointly owned intellectual property, and the costs of securing intellectual property covered in the option agreement.
- Agreement to a special U.S. competitiveness for the U.S. textile industry whereby: (1) the term *substantial manufacture* was defined as 80% of the value added to a product, and (2) the manufacture of machinery or use of manufacturing processes and systems (including software) produced through the use of intellectual property developed under any CRADA was limited to the United States for a period of five years.

United States Council for Automotive Research

Another master agreement with a major industrial sector was the protocol document signed on December 3, 1993, by DOE, its participating national laboratories, and the U.S. automobile manufacturing industry, as represented by the United States Council for Automotive Research (USCAR).

The protocol document with its attached master CRADA responded to the New Generation of Vehicles (NGV) Initiative announced by President Clinton on September 29, 1993. This initiative specified that Federal agencies would, within 60 days, provide generic procedures for CRADAs that facilitated industrial partners working with the federal laboratories, such as DOE's national laboratories.

DOE and the big three domestic car companies agreed that the master CRADA set forth in the protocol document satisfied the generic procedures identified in the initiative.

Features of the protocol document and attached master CRADA and guidelines included:

- Authorization by DOE for each participating national laboratory to use the master CRADA in all CRADAs with the USCAR partnerships.

- Agreement by the participating national laboratories to use the master CRADA in all their CRADAs with the USCAR partnerships.
- Agreement by the big three domestic car companies to use the master CRADA in all CRADAs with the national laboratories.
- Agreement to develop appropriate multi-year program plans to further the NGV Initiative.
- Agreement to develop mutually acceptable measures of performance associated with meeting the goals of the multi-year program plan, including the benefits to the U.S. economy, environment, and energy security.
- Incorporation of the CRADA Class Patent Waiver in the approved master CRADA, whereby each party to the CRADA was accorded the first option to elect to retain title to any invention(s) made by its employees.
- Approval of a generic JWS for each area of technology proposed for the collaborative program.
- Agreement by each party to the CRADA to grant a nonexclusive, paid-up, worldwide license to the other party, as a minimum, in any patent that issued on an invention that was made during the performance of the CRADA.
- Agreement by each party to the CRADA to grant to the other party, subject to prior commitments, a nonexclusive license on reasonable terms and conditions to any other patent owned or controlled by the inventing party that are necessary for applying the technology embodied in information first produced in the CRADA.
- Agreement by the national laboratory to grant an option to any entity formed by the members' companies of USCAR to negotiate an exclusive license on any of its inventions made during the performance of the CRADA on reasonable terms and conditions.
- Agreement by the member companies of USCAR to a U.S. competitiveness clause (1) that their share of joint research projects under each CRADA would be conducted predominately in U.S.-based facilities during the term of the CRADA and for a period of two years after completion of the CRADA, and (2) that they would promote early and first utilization and/or commercialization of products, processes, or services using intellectual property arising from the program in U.S.-based facilities of the member companies of USCAR and their suppliers.

American Iron and Steel Institute

Unlike the previously discussed models, DOE's Metal Initiative Program, which included collaborative R&D projects with the steel, aluminum, and copper process technologies, did not involve an overarching MOU or protocol document. Rather, DOE implemented this collaborative program through a cooperative agreement and a patent waiver.

In order to place title to all inventions arising from its Metal Initiative Program in a single entity and to promote more effectively the commercialization of the technology, DOE granted a patent waiver to one or more holding companies that would hold title for the beneficial interests of the industrial participants in any given collaborative project(s).

The industrial participants in the Metal Initiative subsequently designated the American Iron and Steel Institute (AISI) as its holding company for controlling and licensing technology and patents emanating from any collaborative projects with DOE under this program. AISI, as the patent broker for the industrial participants, had the right to elect to retain title to any invention made under the Metal Initiative Program. It could, in turn, license the invention to the individual industrial participants on a royalty-free, nonexclusive basis and to other nonindustrial participants on reasonable commercial terms and conditions, including reasonable royalty rates.

Another unique feature of the Metal Initiative Program was the issuance by DOE of an Exceptional Circumstance Determination in the program. Because many of the funding partners in the Metal Initiative were small businesses and nonprofit organizations, which normally obtained title to inventions made in their work, DOE issued an Exceptional Circumstances Determination that permitted title to flow to the designated holding company.

Each waived invention was subject to the standard government nonexclusive, paid-up license, government march-in rights, and a U.S. preference provision that required a commitment that any products sold in the United States be manufactured substantially in the United States.

Additionally, AISI could license U.S. and non-U.S. concerns for use of any waived invention in the United States and in foreign countries, provided that the products developed and manufactured in foreign countries have not been adjudged to compete unfairly with products developed and manufactured in the United States.

AISI also had the right to license a special category of technical data first produced in the performance of the various projects under the Metal Initiative. This category of technical data, identified as Protected Metals Initiative Data, could be made available by AISI to any industrial participant for use in the Metals Initiative under nondisclosure and confidentiality obligations.

Lastly, Congress mandated that the federal government be repaid a sum of up to 150% of its expenditures under the Metal Initiative Program. AISI agreed in the cooperative agreement to a repayment provision of a percentage of the net royalties until DOE received the stated sum.

APPENDIX 4. DOE Cooperative Research and Development Agreements Manual

This document dated January 12, 2001, provides a manual with detailed requirements for the performance of technology transfer through the use of Cooperative Research and Development Agreements (CRADAs). The modular CRADA agreement is contained in html and pdf versions of the manual:

- html (http://www.directives.doe.gov/pdfs/doe/doetext/neword/483/m4831-1.html) and
- pdf (http://www.directives.doe.gov/pdfs/doe/doetext/neword/483/m4831-1.pdf).

Questions concerning this manual should be addressed to the Office of Science and Technology Policy Analysis at: (202) 568-3900.

APPENDIX 5. Reimbursable Work for Non-Federal Sponsors Process Manual

This manual, DOE M 481.1-1A Chg 1, approved Septemer 28, 2001, establishes requirements for the performance of work for non-Department of Energy entities by DOE contractor personnel and/or the use of DOE facilities that is not directly funded by DOE appropriations.

The manual is available in html and pdf versions:

- html (http://www.directives.doe.gov/pdfs/doe/doetext/neword/481/m4811-1ac1.html)
- pdf (http://www.directives.doe.gov/pdfs/doe/doetext/neword/481/m4811-1ac1.pdf).